

having small numbers of times of use with the dummy wafers having large numbers of times of use. For these reasons, the dummy wafers can be used effectively without any problem when plasma cleaning is carried out.

Furthermore, in accordance with the present invention, the apparatus can have a plurality of processing chambers and can transfer wafers and dummy wafers by the same conveyor. Since plasma cleaning can be carried out by managing the timing of cleaning of each processing chamber by the controller, the cleaning cycle can be set arbitrarily, dry cleaning can be carried out without interrupting the flow of the processing, the processing can be effectively made and the productivity can be improved.

As described above, according to the present invention, there are effects that the construction of the apparatus is simple, the substrates to be processed are free from contamination and the production yield is high.

What is claimed is:

1. A conveyor system for use in vacuum processing apparatus comprising;

a cassette mount unit, provided with a cassette, for receiving plural substrates to be processed;

a conveyor loader having a first conveyor unit for conveying substrates to be processed;

a load lock chamber for receiving said substrates to be processed from said first conveyor unit;

an unload lock chamber for delivering said substrates, which have been processed, to said first conveyor unit, said unload lock chamber being a separate chamber from said load lock chamber; and

a vacuum conveyor load unit, having a conveyor chamber, and comprising a second conveyor unit, which conveys said substrates to be processed between said load lock chamber or said unload lock chamber and at least one of a plurality of vacuum processing chambers, wherein: said conveyor loader is disposed in front of the load lock chamber and the unload lock chamber, between the cassette mount unit and the two lock chambers, and the substrates are loaded and unloaded between said cassette and the plurality of vacuum processing chambers, and said plural vacuum processing chambers treat said substrates with surfaces thereof which are treated being kept horizontal.

2. A conveyor system for use in a vacuum processing apparatus, comprising;

a cassette mount unit provided with plural cassettes for receiving plural substrates to be processed;

a conveyor loader having a first conveyor unit for conveying said substrates;

a load lock chamber for receiving said substrates to be processed from said first conveyor unit;

an unload lock chamber for delivering said substrates which have been processed, to said first conveyor unit, said unload lock chamber being a separate chamber from said load lock chamber, and the first conveyor unit passing the substrates in a first direction when conveying said substrates to be processed to the load lock chamber and passing said substrates in a second direction opposite the first direction when passing substrates from the unload lock chamber; and

a vacuum conveyor load unit, having a conveyor chamber, and comprising a second conveyor unit, which conveys the substrates between said load lock chamber or said unload lock chamber and at least one of a plurality of vacuum processing chambers, wherein:

said conveyor loader is disposed in front of the load and unload lock chambers, between the cassette mount unit and the two lock chambers, and

the substrates are loaded and unloaded between said cassettes and the plurality of vacuum processing chambers, and said plural vacuum processing chambers treat said substrates with surfaces thereof which are treated being kept horizontal.

3. A conveyor system according to claim 2, wherein said vacuum processing chambers carry out plural processing selected from the group consisting of dry etching, chemical vapor deposition and sputtering.

4. A conveyor system for use in a vacuum processing apparatus, comprising:

a cassette mount unit for receiving plural substrates to be processed, and for receiving substrates which have been processed;

a conveyor loader having a first conveyor unit for conveying said substrates;

a load lock chamber for receiving said substrates from said first conveyor unit;

an unload lock chamber for delivering a substrate, of said substrates, which has been processed, to said first conveyor unit, said unload lock chamber being a separate chamber from said load lock chamber, and the cassette mount unit being positioned in front of said load lock chamber or said unload lock chamber; and

a vacuum conveyor load unit, having a conveyor chamber, and comprising a second conveyor unit which conveys said substrates between said load lock chamber or said unload lock chamber and at least one of a plurality of vacuum processing chambers,

each of said plurality of vacuum processing chambers having a substrate table to maintain surfaces of said substrates, which are processed, horizontal during a vacuum processing,

said conveyor loader being disposed in front of the load and unload lock chambers between the cassette mount unit and the load and unload lock chambers,

the substrates being loaded and unloaded between said cassettes and the plurality of vacuum processing chambers, and

said plurality of vacuum processing chambers treating said substrates with surfaces thereof which are treated being kept horizontal.

5. A conveyor system for use in a vacuum processing apparatus, comprising:

a transfer device arranged so as to access plural cassettes and plural lock chambers;

a cassette table arranged to direct a wafer takeout port of said plural cassettes toward a side of said transfer device, the cassette table being located so as to position the cassettes in front of said plural lock chambers;

said plural lock chambers, having gate valves directed toward said transfer device, and comprising a load lock chamber and an unload lock chamber; and

a vacuum buffer chamber having plural gate valves at a surrounding portion which are disposed to enable plural vacuum processing chambers to be connected with said plural lock chambers,

wherein said transfer device is disposed in front of the plural lock chambers between the cassette table and said plural lock chambers,

wherein each of the lock chambers is provided with both an inlet and an outlet located in a horizontal line,

wherein another transfer device is provided in said vacuum buffer chamber and is provided with an arm extendable into the double lock chambers and across inlets to the plural vacuum processing chambers, so as to support substrates with surfaces thereof which are treated being kept horizontal, such that said plural vacuum processing chambers treat said substrates with the surfaces being horizontal, and
 wherein the substrates are sequentially loaded and unloaded in order between the cassettes and said plural vacuum chambers.

6. Apparatus for carrying out a method including steps of:
 (i) placing a cassette containing wafers to be processed at a cassette table;

(ii) loading said wafers sequentially in order from said cassette by means of a conveyor and a load lock chamber; and

(iii) unloading processed wafers by means of an unload lock chamber and said conveyor,
 said apparatus comprising:

a first loader provided with a conveying structure for conveying the wafers;

a second loader provided with a convey chamber, another conveying structure and plural vacuum processing chambers.

said cassette table, for disposing cassettes containing wafers to be processed, the cassettes being disposed in a single row in front of said load and unload lock chambers; and

said load and unload lock chambers, in which wafers are transferred from an atmosphere to vacuum and from vacuum to the atmosphere,

wherein said conveying structure is adapted to transfer wafers between a cassette at said cassette table and said load and unload lock chambers, to transfer wafers from said cassette to said load lock chamber and from said unload lock chamber to said cassette, wherein said conveying structure is disposed in front of said load and unload lock chambers, between the cassettes and the load and unload lock chambers, wherein each of the lock chambers is provided with both an inlet and an outlet located in a horizontal line,

wherein each of said plural vacuum processing chambers has a wafer table to maintain horizontal a surface of a substrate which is treated during a vacuum processing, so that the surfaces treated in the plural vacuum processing chambers are horizontal during the vacuum processing,

wherein the substrates are sequentially transferred one by one from said first loader to said second loader and from said second loader to said first loader through said lock chambers,

wherein the wafers are one by one loaded and unloaded from cassettes into said plural vacuum processing chambers, and

wherein in said vacuum processing chamber, a processing selected from the group consisting of dry etching, chemical vapor deposition and sputtering is performed.

7. A vacuum processing apparatus, comprising:

a first loader provided with a conveying structure for conveying substrates;

a second loader provided with a convey chamber, another conveying structure and plural vacuum processing chambers; and lock chambers for connecting said first loader and said second loader, wherein:

said first loader includes a cassette mount unit located outside of said lock chambers, and
 said cassette mount unit has a cassette positioning plane in which all cassettes, containing samples to be processed, are positioned in a single row in front of said lock chambers,

said first loader is disposed in front of said lock chambers between the cassette mount unit and said lock chambers,
 said lock chambers are respectively provided with gate valves respectively at both an inlet and an outlet located in a horizontal line, and

said vacuum processing chambers carry out a processing selected from the group consisting of dry etching, chemical vapor deposition and sputtering.

8. A vacuum processing apparatus, comprising:

a first loader provide with a conveying structure for conveying substrates;

a second loader provided with a convey chamber, another conveying structure and plural vacuum processing chambers; and

lock chambers for connecting said first loader and said second loader,

wherein:

said first loader includes a cassette mount unit located outside of said lock chambers,

said cassette mount unit has a cassette positioning plane in which all cassettes, containing substrates to be processed, are positioned in a single row in front of said lock chambers,

said first loader is disposed in front of a front wall of said lock chambers between the cassette mount unit and said lock chambers,

said lock chambers are respectively provided with both an inlet and an outlet located in a horizontal line, said substrates are loaded and unloaded between the cassettes and said plural vacuum chambers,

said substrates are treated in said plural vacuum processing chambers with surfaces of the substrates which are treated being kept horizontal, and

said plural vacuum processing chambers carry out a processing selected from the group consisting of dry etching, chemical vapor deposition and sputtering.

9. A vacuum processing apparatus, comprising:

a first loader provided with a conveying structure for conveying substrates;

a second loader provided with a convey chamber, another conveying structure and plural vacuum processing chambers; and

lock chambers for connecting said first loader and said second loader,

wherein:

said first loader includes a cassette mount unit located outside of said lock chambers,

said cassette mount unit has a cassette positioning plane in which all cassette, containing substrates to be processed, are positioned in a single row in front of said lock chambers,

said first loader is disposed in front of a front wall of the lock chambers, between said cassette mount unit and said lock chambers,

said lock chambers are provided with both an inlet and an outlet located in a horizontal line,

the substrates are transferred from said first loader to said second loader and from said second loader to said first loader through said lock chambers;

Sub A2

1000
1000
1000
1000
1000
1000
1000
1000
1000
1000

11

said substrates are sequentially one by one loaded and unloaded in order between the cassettes and said plural vacuum processing chambers, and said substrates are treated in said plural vacuum processing chambers with surfaces thereof which are treated being horizontal, and
 said vacuum processing chambers carry out a processing selected from the group consisting of dry etching, chemical vapor deposition and sputtering.

Dub A27

10. A vacuum processing apparatus, comprising:
 a first loader provided with a conveying structure for conveying substrates;
 a second loader provided with a convey chamber, another conveying structure and plural vacuum processing chambers; and
 lock chambers for connecting said first loader and said second loader,
 wherein:
 said first loader includes a cassette mount unit located outside of said lock chambers,
 said cassette mount unit has a cassette positioning plane 20 in which all cassettes, containing substrates to be processed, are positioned in a single row in front of said lock chambers,
 said first loader is disposed in front of the lock chambers between said cassette mount unit and said lock chambers,
 said lock chambers are respectively provided with both an inlet and an outlet located in a horizontal line, the substrates are transferred from said first loader to said second loader and from said second loader to 30 said first loader,
 said substrates are loaded and unloaded between the cassettes and said plural vacuum chambers, and said substrates are treated in said plural vacuum processing chambers with surfaces thereof which are treated, being horizontal 35

11. A vacuum processing apparatus, comprising:
 a first loader provided with a first conveying structure for conveying substrates;
 a second loader provided with a convey chamber, a second conveying structure and plural vacuum processing chambers; and
 lock chambers for connecting said first loader and said second loader, wherein:
 each of said plural vacuum processing chambers has a substrate table, to maintain a surface of a substrate 45 which is treated horizontal during a vacuum processing therein, so that said surface is horizontal during treatment in the plural vacuum processing chambers, said first loader includes cassette tables disposed adjacent to and in parallel with each other located outside of said lock chambers,
 the substrates are transferred, one by one, from said first loader to said second loader and from said second loader to said first loader,
 each of said cassette tables has a cassette positioning 55 plane disposed substantially horizontally,
 said second conveying structure is located in said convey chamber to transfer each substrate between one of said lock chambers and one of said plural vacuum processing chambers, such that said substrates are placed on and removed from said substrate table with said surface horizontal,
 the two conveying structures sequentially load and unload from the cassettes into said plural vacuum processing chambers, and
 said plural vacuum processing chambers carry out a 65 processing selected from the group consisting of dry etching, chemical vapor deposition and sputtering.

12

12. A vacuum processing apparatus, comprising:
 a first loader provided with a first conveying structure for conveying substrates;
 a second loader provided with a convey chamber, a second conveying structure and plural vacuum processing chambers; and
 lock chambers for connecting said first loader and said second loader,
 each of said plural vacuum processing chambers having a substrate table to maintain a surface of a substrate, which is treated in the vacuum processing chambers, horizontal during a vacuum processing, so that the plural vacuum processing chambers treat said substrates with the surface thereof which is treated, being horizontal,
 said first loader including cassette tables disposed adjacent to and in parallel with each other located outside of said lock chambers, and
 each of said cassette tables having a cassette positioning plane disposed substantially horizontally, whereon:
 said two conveying structures transfer the substrates from said first loader to said second loader and from said second loader to said first loader,
 said conveying structure located in said convey chamber acts to transfer each substrate between one of said lock chambers and one of said plural vacuum processing chambers, such that said substrates are placed on and removed from said substrate table with a surface thereof which is treated, being horizontal, said two conveying structures load and unload between the cassettes and said plural vacuum processing chambers, and
 said vacuum processing chambers carry out a processing selected from the group consisting of dry etching, chemical vapor deposition and sputtering.

13. A vacuum processing apparatus, comprising:
 a first loader provided with a first conveying structure for conveying substrates;
 a second loader provided with a convey chamber, a second conveying structure and plural vacuum processing chambers; and
 lock chambers for connecting said first loader and said second loader, wherein:
 each of said plural vacuum processing chambers has a substrate table to maintain a surface of a substrate, which is treated in the vacuum processing chambers, horizontal during a vacuum processing, so that the plural vacuum processing chambers treat said substrates with the surface thereof which is treated, being horizontal,
 said first loader includes cassette tables disposed adjacent to and in parallel with each other located outside of said lock chambers,
 each of said cassette tables has a cassette positioning plane disposed substantially horizontally,
 said second conveying structure is located in said convey chamber to transfer each substrate between one of said lock chambers and one of said plural vacuum processing chambers, such that said substrate is placed on and removed from said substrate table with a surface thereof which is treated, being horizontal, and
 said substrate is loaded and unloaded from a cassette, of said cassettes, into said plural vacuum processing chambers by said two conveying structures.

* * * * *